

## SHOCKPROOF SPINDLE

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

[0001] The present invention relates to a structure of shockproof spindle, and more particularly to a structure that has a C-shaped washer, which has an opening to change the assembly process of the structure of spindle. Because of the new assembly process, a sleeve of the structure is able to modify its dimension to prevent falling of a ball guided in the structure under impact effect. In addition to all of the above, the thickness of the washer increases also, and that can improve the impact absorbing efficiency of the structure.

#### 2. Description of Related Art

[0002] A conventional structure of shockproof spindle is installed in an electric tool, such as an electric drill, for drilling cement wall, and has impact working function. The structure absorbs the impact when a tool installed on the end of the spindle is shocked against the workpiece during operation process. Since the structure works smoothly, the damage or destruction of assembly precision, made by the impact, of the parts in the electric tool is avoided, and the structure is more compact and the operation period is improved.

[0003] Referring to Figure 1, in a conventional structure of shockproof spindle, a spindle 1 inserts through a washer 2, an elastomer 3, and a sleeve 4 sequentially. The sleeve 4 caps the elastomer 3 while the elastomer 3 presses on the top of a base 11 fixed under the spindle 1. Next, a ball 5 is positioned in a chute 41 defined in the sleeve 4, and pushes down the sleeve 4 to compress the elastomer 3 until the ball 5 contacts a chute 12 of the spindle 1 tightly.

[0004] In addition to all of the above, the elastomer 3 held between the base 11 and the sleeve 4 absorbs impact energy when a tool installed on the end of the spindle 1 is shocked against the workpiece during operation process. Since the spindle 1 works smoothly owing to the effect of the elastomer 3, the operators work more easily, and the damage or destruction of assembly precision, made by the impact, of the parts in the electric tool is avoided.

[0005] Furthermore, because the ball 5 of the conventional structure of shockproof spindle must install in the chute 41 of the sleeve 4 after all the other part assembly is finished, and the elastomer 3 is shorter or the chute 41 of the sleeve 4 is lower than the chute 12 for the installation of the ball 5. However, the design of the elastomer 3 or the chute 41 of the sleeve 4 leads to that the chute 41 is lower than the chute 12 of the spindle 1 under impact, and the ball 5 drops from the chute 12. These problems not only cause to lose function of impact absorbing but also destroy the transmission mechanism.

[0006] To overcome the shortcomings, the present invention provides a structure of shockproof spindle to mitigate the aforementioned problems.

#### SUMMARY OF THE INVENTION

[0007] In order to overcome the aforementioned problems of the conventional arts, a structure of shockproof spindle is designed meticulously. On the basis of inventor's practice according to the work, the present invention is useful, and it can solve the problems and limits of the conventional arts.

[0008] To attain the above-stated object, in a structure of shockproof spindle having a spindle inserted through an elastomer, a compressible structure, and a sleeve, a hollow and circular cylinder, sequentially. The sleeve caps the elastomer while the elastomer presses on the top of the base fixed under the spindle. The ball keeps

contact the chute of the spindle and the chute of the sleeve. In addition to all of the above, the elastomer held between the base and the sleeve absorbs the impact when a tool installed on the end of the spindle is shocked against the workpiece during operation process.

**[0009]** The present invention has following improvements. First, the assembly process of the present invention is improved because the washer is a C-shaped plate and has an opening. The thickness of the washer can increase with this assembly process, and the thickness is greater the absorbing efficiency is better. Moreover, the design of the elastomer or the chute of the sleeve is not need to consider the interference between assembly of some parts, and the ball never drops from the chute of spindle. The present invention not only improves the impact absorbing efficiency but also prevents the damage of the transmission mechanism.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0010]** The invention will be better understood and other advantages will become apparent on reading the following description, given by way of non-limiting example and by virtue of the appended figure, in which:

**[0011]** Figure 1 illustrates a perspective view of a conventional spindle structure.

**[0012]** Figure 2 illustrates a perspective view of a shockproof spindle in accordance with the present invention.

**[0013]** Figure 3 illustrates a cross-sectional view of the shockproof spindle in accordance with the present invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0014] Referring to Figures 2 and 3, a shockproof spindle in accordance with the present invention comprises a spindle 1, a washer 6, an elastomer 3, a sleeve 4, and a ball 5.

[0015] The spindle 1 is a cylinder and installs coaxially on a base 11. The cylinder of the spindle 1 forms a chute 12 that is caved along the surface of the cylinder. The base 11 is also a cylinder and has an outer diameter which is greater than the spindle 1.

[0016] The washer 6 is a C-shaped plate made by elastic material and has a sufficient thickness. The opening size of the C-shaped plate, the washer 6, is according to the outer diameter of the spindle 1.

[0017] The elastomer 3 is a compressible structure, such as a compressive spring. The elastomer 3 surrounds the spindle 1 and contacts the upper face of the base 11.

[0018] The sleeve 4 is a hollow cylinder and has an inner surface forming an annular chute 41 that is caved along the inner surface of the upper port of the sleeve 4. The chute 41 holds a portion of the ball 5 inside, and another portion of the ball 5 keeps contact with the chute 12 of the spindle 1. The inner diameter of the chute 41 is according to the outer diameter of the spindle 1, and the lower port of the sleeve 4 can cap the upper port of the elastomer 3.

[0019] The assembly process of the shockproof spindle of the present invention will be described. Firstly, the spindle 1 inserts into the elastomer 3 and the sleeve 4 sequentially, and the sleeve 4 caps the elastomer 3 while the elastomer 3 presses on the top of the base 11 fixed under the spindle 1. Next, the ball 5 is positioned in the chute 41 of the sleeve 4, and pushes down the sleeve 4 to compress

the elastomer 3 until the ball 5 contacts the chute 12 of the spindle 1 tightly. Continuously, the elastomer 3 is allowed to return to normal state, and the spindle 1 inserts into the C-shaped washer 6 through the opening. The washer 6 is thus clipped between the elastomer 3 and the base 11 fixed under the spindle 1, and the thickness of the washer 6 is thick enough to push elastomer 3 upward and to arise the sleeve 4.

**[0020]** About the said structure of shockproof spindle of the present invention, the position, the maximum compressing deformation of the elastomer 3, is according to keep the ball 5 to contact the chute 12 of the spindle 1 and the chute 41 of the sleeve 4 is never lower than the minimum position of the chute 12 of the spindle 1.

**[0021]** In addition to all of the above, the elastomer 3 held between the base 11 and the sleeve 4 absorbs the impact when a tool installed on the end of the spindle 1 is shocked against the workpiece during operation process. Since the spindle 1 works smoothly owing to the effect of the elastomer 3, the operators work more easily, and the damage or destruction of assembly precision, made by the impact, of the parts in the electric tool is avoided.

**[0022]** It is to be understood, however, that even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.